

CLAIMS

What is claimed is:

1. A scalable fish rearing raceway system comprising:

5 (a) one or more fish containment structures having two or more parallel
linear fish channels with semi-circular end sections;

 (b) water intake means, water outflow means, water propulsion means,
water circulation means, and water velocity control means, all in fluid communication
10 with said fish containment structure;

 (c) fish harvesting/grading means further comprising a fish
harvesting/grading channel in fluid communication with said fish containment structure;

15 (d) one or more passive dead and dying fish removal means, whereby
floating dead or submerged dead or dying fish are continuously removed from said fish
containment structure passively employing water current;

 (e) integrated fish sizing and separation means, whereby fish of different
20 sizes are separated out for either retention in said fish containment structure for further
growth, or transferral to said fish harvesting/grading channel for removal from said fish
containment structure; and

 (f) electronic and microprocessor controlled fish feed dispensing means
25 and electronic or microprocessor controlled water quality conditions monitoring means,
whereby all fish feeding is automated and whereby all water conditioning is automated.

2. The scalable fish rearing raceway system according to claim 1, wherein said fish containment structure having two or more parallel linear fish channels with semi-circular ends, includes a centrally located inner portion for housing or supporting said water propulsion means and said dead and dying fish removal means.

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3. The scalable fish rearing raceway system according to claim 1, wherein said fish harvesting/grading channel in fluid communication with said fish containment structure includes fish passageways between said harvesting/grading channel and fish containment means, whereby said passageways accommodate insertable solid barriers which prevent all fish from traveling to said harvesting/grading channel, and insertable mesh or bar barriers which selectively allow fish of varying size to pass into said harvesting/grading channel.

4. The scalable fish rearing raceway system according to claim 2, wherein said one or more passive dead and dying fish removal means includes an integrated hydrocone structure located in said central portion of said semi-circular end sections of said fish containment structure, said hydrocone structure having an arc-shaped fish removal ramp located on the outer edge of said hydrocone structure, whereby said ramp decreases in depth as the water flows into it in a circular direction and floating or submerged dead or dying fish are passively washed up and out of the water within said hydrocone structure.

5. The scalable fish rearing raceway system according to claim 4, wherein said hydrocone structure includes a water outlet located centrally at the bottom of its conical structure for the purpose of allowing sinking debris to be washed out of said hydrocone structure.

6. The scalable fish rearing raceway system according to claim 1, wherein said water propulsion means includes one or more water propulsion pumps configured in conventional U-tube water return structures.

5 7. The scalable fish rearing raceway system according to claim 6, wherein said U-tube water return structures includes oxygen injection means which facilitates oxygenation of the water within said fish containment structure.

8. The scalable fish rearing raceway system according to claim 1, wherein said
10 fish containment structure includes two or more fish containment structures each having three or more parallel linear fish channels with semi-circular end sections and a common inner dividing wall.

9. The scalable fish rearing raceway system according to claim 8, wherein said
15 fish production raceway zones includes one or more particulate removal means, said particulate removal means further comprising a screened drain box located in the floor of said fish production raceway zone.

10. The scalable fish rearing raceway system according to claim 1, wherein said
20 electronic or microprocessor controlled water conditions monitoring means includes sensors for monitoring water clarity, water temperature, water dissolved oxygen content, water ammonia content, water pH, water carbon dioxide content, and water mineral content.

25 11. The scalable fish rearing raceway system according to claim 2, wherein said central portion of said fish containment structure includes a water treatment zone which houses and supports effluent wastewater treatment means.

12. The scalable fish rearing raceway system according to claim 1, wherein said water circulation means includes conventional water paddlewheels located at the surface of the water which both cause water flow and removal of CO₂ from water.

5 13. The scalable fish rearing raceway system according to claim 1, wherein said water velocity control means includes a series of water jets located on the floor of said fish containment structure, having a baffle means adjustably mounted in the floor of the raceway in front of the said jets, whereby the angle of said baffle means is varied to regulate water velocity within said fish containment structure.

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14. The scalable fish rearing raceway system according to claim 13, wherein said water velocity control means further includes adjustable floor spoilers which can be lowered and raised to more accurately control and optimize the water velocity within the fish rearing zones.

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15. A fish rearing system having a passive dead and dying fish removal apparatus comprising:

(a) circular hydrocone structure in fluid communication with the water
20 within a fish rearing tank or raceway, having a conical bottom with walls sloping down to an opening outlet to allow sinking debris and particulate matter to be removed from said circular structure;

(b) a submerged vertical screen panel adjustably extending out from said
25 circular hydrocone structure forming an entrance to direct fish into said dead and dying fish removal apparatus;

(c) a screened ramp which starts at the floor of the fish rearing tank or raceway and uniformly climbs to the water surface along a 90 degree arc of said circular hydrocone structure wall to a flat portion located at the top of said screened ramp;

5 whereby the water flow within the fish rearing tank or raceway is used to passively deliver dead and dying, both floating and submerged fish into the hydrocone structure, up the screened ramp and onto said flat portion at the water surface, where the dead and dying fish are held for easy mechanical removal from the fish rearing system.

10 16. A method for making a scalable fish rearing raceway system comprising the steps of:

(a) providing one or more fish containment structures having two or more parallel linear fish channels with semi-circular ends;

15 (b) providing water intake means, water outflow means, water propulsion means, water circulation means, and water velocity control means, all in fluid communication with said fish containment structure;

20 (c) providing fish harvesting/grading means further comprising a fish harvesting/grading channel in fluid communication with said fish containment structure;

(d) providing one or more dead and dying fish removal means, whereby floating dead or submerged dead or dying fish are continuously removed from said fish
25 containment structure passively employing water current;

(e) providing integrated fish sizing and separation means, whereby fish of different sizes are separated out for either retention in said fish containment structure for

further growth, or transferral to said fish harvesting/grading channel for removal from said fish containment structure; and

- (f) providing electronic and microprocessor controlled fish feed
5 dispensing means and electronic or microprocessor controlled water quality conditions monitoring means, whereby all fish feeding is automated and whereby all water conditioning is automated.

17. The method for making a scalable fish rearing raceway system according to
10 claim 16, wherein said step of providing said fish containment structure having two or more parallel linear fish channels with semi-circular ends, further includes providing a central portion for housing or supporting said water propulsion means and said dead or dying fish removal means.

15 18. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said fish harvesting/grading channel in fluid communication with said fish containment structure further includes providing fish passageways between said harvesting/grading channel and fish containment means, whereby said passageways accommodate insertable solid barriers which prevent all fish
20 from traveling to said harvesting/grading channel, and insertable mesh or barriers which selectively allow fish of varying size to pass into said harvesting/grading channel.

19. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said floating dead or dying fish removal means
25 further includes providing an integrated hydrocone structure located in said central portion of said fish containment structure, said hydrocone structure having an arc-shaped fish removal ramp located on the outer edge of said hydrocone structure, whereby said

ramp decreases in depth as the water flows into it in a circular direction and floating dead or dying fish are washed up and out of the water within said hydrocone structure.

20. The method for making a scalable fish rearing raceway system according to
5 claim 19, wherein said step of providing said hydrocone structure further includes providing a water outlet centrally located at the bottom of its conical structure for the purpose of allowing sinking debris to be washed out of said hydrocone structure.

21. The method for making a scalable fish rearing raceway system according to
10 claim 16, wherein said step of providing said water propulsion means further includes providing one or more water propulsion pumps configured in conventional U-tube water return structures.

22. The method for making a scalable fish rearing raceway system according to
15 claim 21, wherein said step of providing said U-tube water return structures further includes providing oxygen injection means which facilitates oxygenation of the water within said fish containment structure.

23. The method for making a scalable fish rearing raceway system according to
20 claim 16, wherein said step of providing said one or more fish containment structures further includes providing one or more fish containment structures each having three or more parallel linear fish channels with semi-circular end sections and a common inner dividing wall.

25 24. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said fish production raceway zones further includes providing one or more particulate removal means, said particulate removal

means further comprising a screened drain box located in the floor of said fish production raceway zone.

25. The method for making a scalable fish rearing raceway system according to
5 claim 16, wherein said step of providing said electronic or microprocessor controlled water conditions monitoring means further includes providing sensors for monitoring water clarity, water temperature, water dissolved oxygen content, water ammonia content, water pH, water carbon dioxide content, and water mineral content.

10 26. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said central portion of said fish containment structure further includes providing a water treatment zone which houses and supports effluent wastewater treatment means.

15 27. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said water circulation means further includes providing conventional water paddlewheels located at the surface of the water which both cause water flow and removal of CO₂ from water.

20 28. The method for making a scalable fish rearing raceway system according to claim 16, wherein said step of providing said water velocity control means further includes providing a series of water jets located on the floor of said fish containment structure, having a baffle means adjustably mounted in the floor of the raceway in front of the said jets, whereby the angle of said baffle means is varied to regulate water velocity
25 within said fish containment structure.